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ABSTRACT

This study investigated the behavioral differences between high and low achieving students in two Canadian inner city schools. One school consisted predominantly of first generation Portuguese, Greek, and Chinese children, while the other served a predominantly second or third generation population of English speaking Canadians. An academic engaged time model was employed in evaluating the observations of the on task/off task behavior of these elementary school students during mathematics and reading lessons. Findings suggested that high and low achieving inner city children spend a large proportion of time actively engaged in academic tasks, but high achievers spend somewhat more time than low achievers. No significant developmental trends were noted and it was recommended that future studies focus on task appropriateness and student success. (Author/APM)

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An Examination of Achievement Related Behavior of High and Low Achieving Inner City Pupils'

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AN EXAMINATION OF ACHIEVEMENT RELATED BEHAVIOR OF HIGH AND LOW ACHIEVING INNER CITY PUPILS'

ABSTRACT

Incorporating the academic engaged time model the present study investigated behavioral differences between high and low achieving inner city children. Two hundred observations of 'on task' - 'off task' behavior of 136 children within the elementary grades (1 through 6) were noted during reading and mathematics lessons. Findings suggested that high and low achieving inner city children spend a large proportion of time actively engaged in academic tasks with high achievers spending somewhat more time than low achievers. No significant developmental trends were noted and discrepant academic attainment levels of children are discussed in terms of an 'academic learning time' model.

An examination of achievement related behavior of high and low achieving inner city pupils

A review of the literature on classroom behavior clearly suggests a myriad of differential behaviors are correlated with academic success. A great many studies have examined teacher behaviors in relation to student achievement (Rosenshine & Furst, 1971). Unfortunately the large variety of observational systems employed has often minimized the meaningful interpretation of findings leading to taxonomic confusion and the further development of new systems (Emmer & Peck, 1973). Overviews of observational procedures are contained in the works of Flanders (1970), Rosenshine and Furst (1971, 1973), Brophy and Good (1974), Dunkin and Biddle (1 and Gage and Berliner (1975).

Difficulty in the development of observational systems has often arisen since categories of student behavior have largely been included on the basis of theoretical grounds rather than on the basis of ethnographic or empirical data. Incorporating the ethnographic approach adopted by Berliner and Tikunoff (1976) a meaningful categorization of classroom behavior has been documented. However, studies of teacher impact have been inconclusive, with Berliner (1976)

suggesting that student behavior may be the 'mediating link' between teacher behavior and student academic achievement. Recently, research has been concerned with 'academic engaged time' the combination of student engagement and 'opportunity to learn' or 'time allocated' to a particular subject (Berliner & Rosenshine, 1976).

As well, research in the educational process of low SES children generated by studies in the mid-1950's (Bloom, 1956; Bloom & Statler, 1957) and later by the EEO Report (Coleman, Campbell, Hobson, McPortland, Mood, Weinfeld & York, 1966) and its derivatives (Jencks, 1972; Mosteller & Moynihan, 1972) clearly indicated children of low SES fail to attain levels of academic achievement commensurate with those of their middle class counterparts. Considering that children from inner city, low SES areas tend to have retarded academic performance a great number of variables have been examined to account for discrepant scores (e.g., Ausubel, 1965; Bernstein, 1970; Deutsch, 1967; Hunt, 1964; Jensen, 1967). However, studies by Farrell (1973) and Farrell, Derevensky, Hymovitch, Stoloff and Slotowski (1977) suggest that approximately 30 per cent of inner city children are achieving age appropriate academic performance necesitating the need to further investigate differences within SES levels to uncover causes of underachievement.

The present study incorporating the 'academic engaged time' model (Berliner & Rosenshine, 1976), attempted to

examine differences in overt classroom behaviors exhibited by disadvantaged children whose academic achievement was highly discrepant. By incorporating a low inference observational scale developed by Berliner (1975) the present study attempted to explore developmental trends (grades 1-6) which may reveal significant and meaningful patterns of growth in essential attributes affecting academic achievement.

Method

Subjects

The children were selected from two inner-city schools which differed in the populations served. School 1 consisted predominantly of first generation Portuguese, Greek, and Chinese children. School 2 serves a predominantly second or third generation, English speaking Canadian indigent population. High and low achieving pupils were selected on the basis of achievement testing administered during the previous academic year (Farrell et. al., 1977). The total sample of children included 138 pupils (72 males, 66 females) within the elementary grades (grades 1-6). Within each grade level, from each school, 10 children (5 high achievers and 5 low achievers) were selected as 'target' pupils for observation. This yielded an N of 120. On several occasions in School 1, it was

necessary to include additional pupils (using identical criteria) to substitute for regular target pupils who were not available for observation bringing the total N to 138.

Coding System

Behaviors of target pupils were rated on a seven-category scale adapted from "Learning Moves" designed by Marliave, Fisher, Filby and Dishaw (1977) (See Table 1).

Insert Table 1 about here

Procedure

Classification of pupils into high or low achievement grouping was established on the basis of scores obtained on the age appropriate reading and mathematics subtests of the Stanford Achievement Test (SAT). Pupils were selected from the fifteen highest (stanine scores 7, 8, 9) and the fifteen lowest (stanine scores 1, 2, 3) achievers at each grade level from 1 to 6.

Observers were trained in the use of the rating scale by studying the procedures employed by researchers engaged in similar studies (Marliave, et. al., 1977). Inter-rater reliability, using videotape procedures, ranging between 85 and 90 per cent agreement was obtained. Reliability checks were obtained by dividing the number of instances in which

there was agreement by the total number of ratings, multiplied by 100 (R = (agreement/total number of ratings) x 100). It is of importance to note that inter-rater differences rarely occurred over the question as to whether or not a pupil was academically engaged. Rather, differences in interpretation usually arose over the issue of how the pupil was demonstrating 'on task' or 'off task' behavior.

After establishing rapport the observer positioned herself enabling observation of eye and head orientation of each target child. Each observer was equipped with a stop-watch and a behavior coding form. At the beginning of each minute the observer located the first target pupil, observed him for a period lasting up to 10 seconds, recorded the rating of his behavior and proceeded to repeat the same procedure with each of the remaining target pupils. This cycle took place in the same sequential order every 60 seconds, during the entire lesson. A minimum number of two hundred observation-ratings per child (100 during math and 100 during reading lessons) were obtained. Observations recorded for each subject area were spaced over a minimum of four separate instructional sessions over four separate days. Through this design an attempt was made to gain a representative behavioral sample for each child across subject areas and time.

Results

In order to examine the academic engaged time model a three way multivariate analysis of variance (6x2x2) with repeated measures using grade, school, achievement level and the 7 behavioral measures was performed. The multivariate analysis revealed significant overall differences between grades (Table 2) for both reading ($F = 12.63$, $df = 35,393$, $p < .01$) and math ($F = 13.77$, $df = 35.431$, $p < .01$). All univariate interactions were significant ($p < .05$) except one, obtained in mathematics scores, on grade x category NI ($p > .05$).

Insert Table 2 about here

Table 3 illustrates the results of the analysis of variance for the effects of achievement level in reading and math. There was a significant main effect for reading ($F = 9.19$, $df = 7,92$, $p < 01$). Significant univariate interactions were obtained in both reading and math for categories EW and NO ($p < .01$), in category EC for reading and in category EO in math ($p < .01$).

Results of school differences in reading and math (Table 4) reveal significant main effects for both reading

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Insert Table 4 about here

(F= 35.43, df= 7,93, p <.01) and math (F= 82,65, df= 7,102, p <.01). Significant univariate analyses occurred throughout (p < .01) except on category EO in reading and categories EC and NO in math (p > .05).

Significant differences between the behaviors of high and low achievers were found to occur not only across grades but also between grades. Results of the multivariate and univariate analyses of variance revealed significant main effects for reading (F = 6.17, df = 35,393, p < .01) and math (F = 2.86, df = 35,431, p < .01). All univariate analyses were significant (p < .05) except those for category NI in reading and categories EW and ED in math (p > .05).

Differences were found to exist between children in different grades both across (Table 4) and within schools (main effects for both reading (F = 12.32, df = 35,393, p < .01) and math (F = 9.92, df = 35,431), all univariate interactions being significant (p < .01).

A multivariate analysis to determine the effects associated with grade, school and achievement level on a single measure of behavior incorporating all 'on task'

behaviors was performed. Categories EW, EO, EC and ED were combined to form one behavioral index of an 'on task' behavior. 'On task' behavior was calculated by the following formula:

$$\frac{EW + EO + EC + ED}{EW + EO + EC + ED + NI + NW + NO} \times 100$$

Table 5 presents the percent 'on task' behavior by both

Insert Table 5 about here

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school, age, and achievement level allowing one to gain an index of the differential proportion of time pupils spent 'on task'. The multivariate analyses of variance corroborates previously found results even when grouping by 'on task' and 'off task' behavioral categories (See Table 6).

Insert Table 6 about here

Cononical correlations performed comparing all combinations of observations (first third, second third, final third) suggested a representative measure of behavior was ascertained (r ranged from .62 to .85, <, p <.001). A second canonical correlation sought to determine the

relationship between each pupil's behavior across academic settings. This analysis was performed by deriving a linear composite score from the 7 behavioral categories in both reading and math for each pupil. The results of the canonical correlation between reading and math suggest a very strong relationship between exhibited behavior across acadmeic settings ($r = .79$, $p < .001$).

Discussion

High achieving children, as compared with low achieving children were found to spend a significantly greater proportion of their time academically engaged in activities such as listening, asking questions, and seatwork, thought to be conducive to the acquisition of knowledge in the classroom setting. This finding is consistant with those of previous investigations, in which rates of attending behavior have been compared with levels of scholastic attainment (Lahaderne, 1968; Cobb, 1972).

Although the multivariate analyses yielded significant main effects a close inspection of the mean proportion of 'on task' behavior revealed interesting insights into the meaningfulness of the statistical findings. On the average, high achieving pupils were found to engage in 'on task' behavior 85 per cent of the time allocated to reading and math instruction; low achieving pupils were found to

demonstrate the same behavior under similar conditions for approximately 75 per cent of the time. This finding clearly suggests that all the children in the present study were found to spend considerably more time engaged in 'on task' behavior than has been previously reported (Forness, Guthrie, & Hall, 1976). Although it is possible that this discrepancy is an artifactual finding, resulting from observing an atypical sample of the population, the use of a dissimilar coding system or a difference in interpretation, it is not likely that this is the case. Berliner (Note 1), having investigated the classroom behavior of children living in the San Francisco Bay area and using a coding system similar to the one employed in the present study, reported that the mean 'on task' time was approximately 75 per cent. He suggests that it seems more likely that this discrepancy may reflect some cross cultural differences between Canadian and American school children. Indeed, Bloom (1974) reports large cross cultural differences in student engagement, known to range from 50 to 90 per cent, or more, of class time. However, this cross cultural difference may not merely reflect a difference in pupil behavior, but also suggest differences in teachers' skill in keeping pupils motivated and engaged in academic tasks. Second, and more important, it seems that time differences in 'on task' behavior between the high and low achievers (i.e., 85 vs 75 per cent), may be statistically significant

but perhaps educationally meaningless. In terms of everyday classroom life, this 10 per cent difference accounts for a total of 6 minutes of 'on task' behavior per hour (i.e., 51 vs 45 minutes per hour). While this may add up to a substantial amount of time over a school year, clearly, it does not seem plausible that the large difference between the academic attainment levels of high and low achievers in this study could be substantially related to such a relatively small time difference.

The academic engaged time model may be an oversimplification supporting Berliner's (Note 1) new model of 'Academic Learning Time' (ALT). The basic components of ALT includes allocated time, rate of student engagement, plus a third critical process variable - rate of student success. Success rate is intended to reflect the degree of appropriateness of assigned tasks as well as the child's performance. The degree of appropriateness is believed to be a function of the level of task difficulty and to have a direct influence on the amount learned.

Applying the ALT model and incorporating Carrol's (1963) definition of aptitude - the amount of time needed by a student to reach a criterion, allows this research to be described as an observational study, examining the classroom behavior of fast and slow learners. The high achievement group was found to be highly engaged in appropriate tasks, yielding high levels of achievement; the latter almost

equally engaged, but in inappropriate tasks, yielding low levels of achievement. Thus, the most critical differences between the two groups tend to be the speed with which they process information and the appropriateness of assigned tasks.

The data on achievement related behavior also suggest several findings pertinant to the nature of daily classroom activity. A perusal of the univariate statistics and proportions of behavioral ratings across categories reveals that a consistently high frequency of behavior was classified as engaged-written, engaged-covert and, not engaged-off task; and engaged-directions, not engaged-interim and not engaged-waiting. The data suggests that the children are offered relatively little opportunity to discuss academically related topics with their peers or teachers and minimal class time during reading or math lessons is devoted to activities which do not directly contribute to covering academic content, e.g., waiting for help, getting organized and preparing.

The results of the canonical correlations suggest no significant difference between behavior exhibited in math and reading instruction, a finding consistent with the results of Soli and Devine (1976). Still further, the results tend to suggest that inter-individual differences in achievement related behavior do not appear to be related to ethnicity in any meaningful way, and are quite stable across

grade levels.

The results clearly suggest Canadian inner-city pupils spend a large proportion (approximately 80 per cent) of instructional time actively engaged in behavior conducive to learning. High achieving pupils demonstrated only slightly more 'on task' behavior than low achieving pupils implying that the major differences between these groups are not primarily a function of time differences in manifestations of achievement related behavior. Thus the academic engaged time model alone remains insufficient to account for academic success. Rather observational studies of classroom interaction must begin to focus on task appropriateness and student success as suggested by the Academic Learning Time model. Given the findings that teachers can be trained to use research data on effective use of time (Stallings, 1980), a significant positive approach in effective teaching processes may be realized.

Notes

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Table 1

BEHAVIORAL CATEGORIES

EW:	Engaged-Written, e.g., using pencil or crayon directly related to lesson.
EO:	Engaged-Oral, e.g., question, response or discussion with teacher or peers pertaining to lesson.
EC:	Engaged-Covert, e.g., listening, reading silently, thinking.
ED:	Engaged-Directions, e.g., turning pages, walking to the teacher when appropriate.
NI:	Not engaged-Interim, e.g., nonacademic activity, preparing for lesson, finding materials.
NW:	Not engaged-Waiting, e.g., waiting for teacher's help or corrections.
NO:	Not engaged-Off Task, e.g., daydreaming, socializing, misbehaving.

TABLE 2

MULTIVARIATE AND UNIVARIATE ANALYSES OF VARIANCE FOR ALL CATEGORIES*
By Grade.

Category	Mean Squares		F	df	p
	Between	Within			
READING					
Multivariate			12.63	35,393	< .001
Univariate					
EW	426.32	41.70	10.22	5,99	< .001
EO	60.16	9.05	6.64		< .001
EC	3234.15	116.53	27.75		< .001
ED	43.44	1.32	32.83		< .001
NI	78.50	5.35	14.64		< .001
NW	4.20	1.43	2.93		.016
NO	439.29	85.23	5.15		< .001
MATHEMATICS					
Multivariate			13.77	35,431	< .001
Univariate					
EW	1654.18	111.57	14.82	5,108	< .001
EO	134.60	7.20	18.68		< .001
EC	3872.45	143.45	26.99		< .001
ED	40.98	1.32	31.00		< .001
NI	5.66	2.66	2.12		.068
NW	18.11	2.09	8.65		< .001
NO	95.48	95.42	1.00		.041

* EW: Engaged-Written
EO: Engaged-Oral
NC: Engaged-Covert
ND: Engaged-Directions
NI: Not engaged-Interim
NW: Not engaged-Waiting
NO: Not engaged-Off task

TABLE 3

MULTIVARIATE AND UNIVARIATE ANALYSES OF VARIANCE FOR ALL CATEGORIES*
By Achievement Level.

Category	Mean Squares		F	df	p
	Between	Within			
READING					
Multivariate			9.19	7,93	<.001
Univariate					
EW	489.89	41.70	11.74	1,99	< .001
EO	0.13	9.05	0.01		.904
EC	4814.48	116.56	41.31		< .001
ED	3.80	1.32	2.87		.093
NI	3.33	5.35	0.62		.431
NW	4.18	1.43	2.92		.090
NO	4309.41	85.23	50.56		< .001
MATHEMATICS					
Multivariate			11.34	7,102	<.001
Univariate					
EW	789.58	111.57	7.07		.009
EO	356.30	7.20	49.46		.001
EC	231.58	143.45	1.61		.207
ED	.35	1.32	.26		.606
NI	8.63	2.66	3.24		.074
NW	5.31	2.09	2.54		.114
NO	3778.71	95.42	39.60		<.001

* EW: Engaged-Written
EO: Engaged-Oral
EC: Engaged-Covert
ED: Engaged-Directions
NI: Not engaged-Interim
NW: Not engaged-Waiting
NO: Not engaged-Off task

TABLE 4

MULTIVARIATE AND UNIVARIATE ANALYSES OF VARIANCE FOR ALL CATEGORIES*
By School.

Category	Mean Squares		F	df	p
	Between	Within			
READING					
Multivariate			35.43	7,93	< .001
Univariate					
EW	3359.45	41.70	80.56	1,99	< .001
EO	26.42	9.05	2.91		.091
EC	2039.93	116.56	17.50		< .001
ED	70.28	1.32	53.12		< .001
NI	36.14	5.35	6.74		.011
NW	96.98	1.43	67.79		< .001
NO	486.65	85.23	5.70		.019
MATHEMATICS					
Multivariate			82.65	7,102	< .001
Univariate					
EW	47410.11	111.57	424.91	1,108	< .001
EO	112.72	7.20	15.65		< .001
EC	430.09	143.45	2.99		.086
ED	64.69	1.32	48.94		< .001
NI	249.30	2.66	93.69		< .001
NW	158.53	2.09	75.72		< .001
NO	14.11	95.42	.14		.701

* EW: Engaged-Written
EO: Engaged-Oral
EC: Engaged-Covert
ED: Engaged-Directions
NI: Not engaged-Interim
NW: Not engaged-Waiting
NO: Not engaged-Off task

TABLE 5

MEAN PROPORTIONS OF ON TASK* BEHAVIOR BY SCHOOL AND ACHIEVEMENT LEVEL

Grade	School 1		School 2	
	High Achievers	Low Achievers	High Achievers	Low Achievers
Reading				
1	87.79	81.85	84.16	86.09
2	82.51	64.92	68.95	57.92
3	70.32	85.92	88.15	68.66
4	83.67	75.41	87.97	72.47
5	96.56	55.83	85.25	73.05
6	96.56	55.83	96.87	97.40
Mean	86.23	69.96	85.23	75.93
Math				
1	82.64	83.16	86.32	82.25
2	88.54	73.84	74.85	70.80
3	82.34	82.06	88.10	71.33
4	86.67	82.32	87.17	76.97
5	94.18	75.51	88.20	81.11
6	87.21	82.30	91.47	71.67
Mean	86.93	79.86	86.01	75.68

* Proportion of On Task Behavior = $\frac{EW+EO+EC+ED}{EW+EO+EC+ED+NI+NW+NO} \times 100$

TABLE 6

SUMMARY OF MULTIVARIATE ANALYSES OF VARIANCE FOR ON TASK* BEHAVIOR. Sources of variance are: GRADE (A), ACHIEVEMENT LEVEL (B), and SCHOOL (C).

	Reading			Math		
Source	F	df	p	F	df	p
A	17.42	20,319	< .001	18.78	20,349	<.001
B	14.85	4,96	< .001	18.49	4,105	<.001
C	32.52	4,96	< .001	77.71	4,105	<.001
A x B	7.69	20,319	< .001	2.49	20,349	<.001
A x C	14.45	20,319	< .001	6.84	20,349	<.001
B x C	.70	4,96	.592	2.78	4,105	<.030
A x B x C	6.07	20,319	<.001	3.12	20,349	<.001

* On Task = $\frac{EW+EO+EC+ED}{EW+EO+EC+ED+NI+NW+NO}$

TABLE 7

SUMMARY OF MULTIVARIATE ANALYSES OF VARIANCE FOR ON TASK* BEHAVIOR
Sources of variance are: GRADE (A), ACHIEVEMENT LEVEL (B) AND SCHOOL (C).

Source	Reading F	Reading df	Reading p	Math F	Math df	Math p
A	17.42	20,319	< .001	18.78	20,349	<.001
B	14.85	4,96	<.001	18.49	4,105	<.001
C	32.52	4,96	<.001	77.71	4,105	<.001
A x B	7.69	20,319	<.001	2.49	20,349	<.001
A x C	14.45	20,319	<.001	6.84	20,349	<.001
B x C	.70	4,96	.592	2.78	4,105	<.030
A x B x C	6.07	20,319	<.001	3.12	20,349	<.001

* On Task = $\frac{EW+EO+EC+ED}{EW+EO+EC+ED+NI+NW+NO}$